

Chapter 1 Introduction and Overview

Background

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future. Interior's people and programs impact all Americans. The Department is the steward of 20 percent of the Nation's lands. Interior manages national parks, national wildlife refuges, and public lands and assists States, Tribes, and others in the management of natural and cultural resources. Interior provides access to public lands and offshore areas for renewable and conventional energy development—covering a quarter of the Nation's supplies of oil and natural gas—ensuring safety, environmental protection and revenue collection for the American public. Interior manages the protection and restoration of surface mined lands. The Department is the largest supplier and manager of water in the 17 Western States, assists others with water conservation and extending water supplies, and provides hydropower resources to power much of the Nation. The Department serves as Trustee to American Indians, Alaska Natives, and Hawaiian Natives.

The Department supports cutting edge research in geology, hydrology, and biology, informing resource management and community protection at Interior and across the world. In addition, through employment and educational opportunities offered by the Department, youth will have a key role in creating a new energy frontier, tackling climate change issues, empowering Native communities, improving our National Parks, enhancing wildlife habitat, and restoring our cultural and historic landmarks.¹

In general, the U.S. economy continued to recover from the deep recession that began at the end of 2007.² The goods and services provided by the lands managed by DOI helped to support this economic recovery. These goods and services include outputs bought and sold in markets (e.g., such as oil and gas) as well as ecosystem goods and services that are not typically bought and sold in markets (such as clean water, recreation, habitat for fish and wildlife). Ecosystems (and their service flows) represent a special

¹ Interior has also benefited from government wide youth programs. In accordance with Executive Order 13562 signed December 27th 2010, the Pathways program eliminated previous student hiring authorities and established three new programs to engage youth in government service: the Internship Program, the Recent Graduates Program, and a reinvigorated Presidential Management Fellows (PMF) Program. For additional information see: <http://www.opm.gov/HiringReform/Pathways/index.aspx>.

² Real GDP increased 2.2 percent in 2012 (that is, from the 2011 annual level to the 2012 annual level), compared with an increase of 1.8 percent in 2011. In 2012, employment growth averaged 181,000 per month (<http://bls.gov/news.release/empsit.toc.htm>). GDP, or Gross Domestic Product, is a commonly used measure of economic performance and measures the value of the goods and services produced by an economy. "Real" measures reflect quantities independent of prices, allowing comparison of measures over periods in which prices have changed. GDP represents the market value of all final goods and services produced in a country, i.e., domestic value added which can be shown to be identical to the sum of payments to labor (i.e. salaries, wages and bonuses) plus payments to capital (i.e. profits). GDP is an imperfect measure of wellbeing or welfare for a variety of reasons.

form of wealth -- natural capital -- that humans depend on for a whole range of important benefits. While degraded or damaged ecosystems can sometimes be restored, in general, unlike skills, education, machines, etc., we cannot manufacture new natural capital.

Natural resources that are bought and sold in markets (e.g., oil, minerals, timber, forage, fish, etc.) contribute to a wide range of intermediate and final products. In addition, a substantial body of research over the past 30 years has demonstrated that people value the environment directly even where there is no market for environmental amenities.

The ecosystem services that are provided by Interior managed lands are typically provided free of charge, with the supply of those services often being influenced by a different set of individuals than those who benefit from the provision of the services. For example, a farmer who maintains wetlands and limits fertilizer application provides benefits of cleaner water and lower probability of flooding to downstream individuals. This mismatch between those who influence the supply of the services and those who benefit from the services can be characterized as a classic externality problem. Numerous potential solutions have been proposed for internalizing the externalities, including payments for ecosystem services, tradable development rights, taxes on activities that result in damages to services, and direct regulations.

Some ecosystem services are traded in markets (e.g., commercial fisheries, timber, etc.) and valuation using market prices is relatively straightforward. But many ecosystem services are “public goods” that are not traded in markets and thus no market prices exist and in many instances market prices would not incorporate external costs or benefits. For services in this category, valuing ecosystem services can be complex. In general, valuation starts with defining an “ecological production function,” that describes the structure and function of an ecosystem and the provision of various ecosystem services; and then translates the physical quantities of services into a common metric via the use of various valuation methodologies.

Youth Employment

The Department of the Interior works to expand job opportunities, engagement and education for youth on our public lands and to facilitate partnerships and volunteer programs that leverage resources for accomplishing the Department’s mission. Through Interior’s youth programs and partnerships, in FY 2012 a total of 19,175 employment opportunities at Interior and organization partners were provided to young people between the ages of 15 and 25. Of this total, 12,579 were employed by DOI and 6,596 were employed by partners. The NPS and organizational partners employed the largest number in FY 2012, with a total of 7,837 youth employed. These programs and partnerships enable participating youth to gain valuable work experience that serves to strengthen their skills and knowledge base. Interior bureaus benefit from the many youth employment activities by being able to attract and retain qualified employees. Additionally, youth hires can often convert to permanent positions, be promoted to a new position, or receive new job assignments. In FY 2012, about 21% (over 2,650) of Interior’s youth employees converted to permanent positions, were promoted to a new position, or received a new job assignment.

The value of some nonmarket ecosystem services has been well studied. For example, there are numerous empirical studies to assess the value of outdoor recreation and numerous applications of economic analysis being used to assess the value of various environmental amenities (access to open space, access to water resources, local air quality). These types of approaches are based on people's revealed preferences. A second type of valuation approach is known as stated preference estimation; this includes survey techniques to estimate people's valuation of an amenity. The strengths and weaknesses of applying both revealed and stated preference methods to value aspects of the environment are well understood. However, practical difficulties in assessing value in a manner that will be viewed as objective, authoritative, and accurate is difficult for some ecosystem services such as those services associated with cultural resources. This difficulty may argue for simply providing information about potential trade-offs among services without attempting to measure all services in the same metric.

The FY 2012 Report

This report represents the fourth in a series of annual reports initiated with a preliminary report released by Interior in December 2009. This chapter presents an overview of the key outputs produced by the Department. The chapter also provides a summary of Interior's economic contributions and value added, employment supported, and economic values associated with some of the outputs. Subsequent chapters on energy, non-fuels minerals, recreation, conservation, and tribal economies provide more detailed economic information on the key outputs and trends associated with each output.

This report differs from the previous reports in several respects: 1) it presents additional information on the physical and biological "outputs" produced by Interior; and 2) it presents additional information on economic "value added." *Gross output*, which represents the value of industry production and has been reported in previous DOI reports as "economic contributions," presents some drawbacks for measuring economic contributions because it does not net out the value of intermediate inputs and thus double-counts some economic activity. *Value added* nets out the cost of intermediate inputs (i.e., goods and services purchased from other industries or imported that are used as inputs to produce a good or service), and is a more appropriate concept when considering Interior's contributions to the nation's gross domestic product (GDP). Of the standard measures available, value added most accurately captures the dollar-value of Interior-managed resources in the U.S. economy. Value added estimates are not available on a comprehensive basis for all Interior resources; this information is provided where such values are readily available.

"Economic impacts" or "economic contributions" as measured by jobs, labor income, value added (contribution to GDP), and output are incomplete measures of "economic value." Economic impacts measure how programs, expenditures, and investments translate to economic growth, employment, and income. Economic value is defined in terms of relative value, and is equal to the amount an individual or society is willing to give up in other goods and services in order to obtain a good, service, or state of the world. More specifically, the economic value of a resource is the amount that society is willing to pay for the resource (not how much they actually pay for the resource).

Figure 1-1 provides a stylized example to illustrate the concept of value added. Trees on a timber lease may ultimately end up as part of a newly constructed house, though there are several supply-chain steps in between. The output approach to economic contributions totals up the sale prices at every step of the chain, in effect double-counting the contributions of intermediate goods. The value added approach focuses on the change in sale price at each step, avoiding this double-counting.




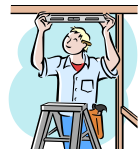

					
	Standing Trees	Timber	Lumber	Framing	Finished House
Sale Price	\$10	\$100	\$1,000	\$10,000	\$100,000
Input Price	\$0	\$10	\$100	\$1,000	\$10,000
Value Added	\$10	\$90	\$900	\$9,000	\$90,000

Figure 1-1. Value Added: A Stylized Example

The measure of output does not account for external costs and benefits not reflected in market prices.³ The implication of not including these costs is that statistics on gross sales or output may over- or understate the actual contribution a given activity or sector makes to the economy. *Value added* is a more appropriate concept when considering Interior's contributions to the nation's GDP, though GDP does not fully capture changes in economic welfare.⁴ Where possible, this report addresses the economic value of Interior's resources and programs, but the focus of the report remains the economic impacts or contributions of the Department of the Interior.

While this report relied on generally similar methodology to estimate value added and economic contributions, the results are not directly comparable to those of earlier reports due to changes in some of the underlying modeling.

Overview of Outputs Produced and Economic Values

Table 1-1 summarizes the quantities of the key physical and biological outputs produced by Interior in FY 2012. The table also provides information (where such information is readily available) on the unit economic values for each commodity. We report a range of economic values associated with each

³ In the Department's economic report for FY 2011, Chapter 7 discussed externalities associated with Interior's activities. This chapter is available on the Department's website at <http://www.doi.gov/ppa/upload/Chapter-7.pdf>

⁴ Economic welfare costs also are not fully measured by changes in GDP. GDP fails to capture nonmarket values, such as environmental improvement or environmental damages. These can be important components of total economic welfare. GDP also can sometimes be misleading: for example, cleanup costs from an oil spill would increase GDP, however, this provides little information about the total economic costs incurred by individuals and society overall.

resource, and we report total production for the year. The table does not associate production with individual unit prices, so we do not report a total value for the annual production.

Table 1-1. Interior-Managed Resources: Production Quantities and Values, FY 2008-FY2012

Commodity	Units	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Recreation^c	<i>Visits to Dol sites (million)</i>	n/a	415	439	434	417
	Estimated range of economic values, \$ per visit	n/a ^b	n/a ^b	n/a ^b	n/a ^b	\$35.98 - \$63.32
Crude oil	<i>Federal production, millions of barrels (mmbbl)</i>	575	657	736	649	626
	WTI - Average value, \$ per bbl (2012-\$) ^d	\$106.29	\$66.30	\$83.69	\$96.84	\$94.05
Natural Gas^e	<i>Federal production, trillions of cubic feet (tcf)</i>	6	6	5	5	4
	Avg wellhead price, \$ per mcf (2012-\$) ^d	\$8.50	\$3.93	\$4.72	\$4.03	\$2.66
Coal^f	<i>Federal production, millions of tons</i>	509	488	478	470	460
	Avg price subbituminous coal, \$ per short ton, (2012-\$)	\$11.34	\$12.17	\$12.71	\$13.94	9.02
Hard rock minerals - gold	<i>Estimated gold production on federal lands, kilograms</i>	100,190	95,890	99,330	100,620	98,900
	Avg gold price, \$/ounce	\$874	\$974	\$1,228	\$1,572	\$1,700
Forage^g	<i>AUMs permitted (millions)</i>	8.55	8.61	8.24	8.27	8.95
	\$ per AUM					\$1.35 - \$17.00
Timber^j	<i>BLM, sawtimber harvested, mbm</i>	162,902	190,504	183,558	217,890	207,451
	<i>BIA harvested timber, mbm</i>	530,972	426,250	396,532	359,697	333,209
	Average western OR BLM price received, \$ per mbf	\$178.12	\$153.39	\$92.57	\$92.55	\$ 119.57

(Table continues)

Commodity	Units	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Electricity generation ⁱ						
Hydroelectric	Net generation, TWh	40.8	39.5	35.8	48.6	47.5
Geothermal	MW installed capacity to-date	0	67.5	30	327	70
Wind ^h	MW installed capacity	140	4	12	160	315
Solar ^h	MW approved capacity	0	0	2,744	1,975	489
	Average on-peak spot electricity price, \$ per MWh	\$65–\$80.14	\$35.66–\$38.31	\$35.90–\$40.21	\$29–\$37	\$22.22–\$34.57
Irrigation and M&I water (estimated)	Acre-feet delivered (estimated)	Estimated annual deliveries: 23.9 million a-f of irrigation water and 2.8 million a-f of M&I water				26.7
	\$ per acre-foot	Values for much of Reclamation-supplied irrigation water are in the range of hundreds of dollars per acre-foot. M&I water is typically valued in the range of one to two thousand dollars per acre-foot. Values depend on the region, end-use, and other circumstances.				
		Some Reclamation-supplied water is delivered for other uses such as FWS refuge water supply or to support instream flows. This water would be valued at its opportunity cost, which depends on alternative uses available.				
Ecosystem services	Ecosystem services are measured in many different metrics; information on annual flows of these services is not readily available. Because most ecosystem services are not bought and sold in markets, prices are not readily available.					

^a Unit values are FY 2012 market values or estimated economic value, depending on the commodity.

^b Currently available datasets do not track visitors' activities, which vary depending on the particular activity. Some example values include \$20 per day for camping, \$49 per day for wildlife viewing, and \$173 per day for mountain biking. See Chapter 2 for additional details.

^c Recreation unit values are the means reported in Loomis (2005), updated to 2012-\$ using the CPI-U. Total visits includes visits to BOR sites.

^d Production is based on ONRR sales and non revenue volumes, by sales year. Crude oil prices are WTI per-barrel spot prices from EIA.gov. The minimum price of \$75.40/bbl was recorded on October 5, 2011; the maximum price of \$109.39/bbl was recorded on February 27, 2012.

^e Production is based on ONRR sales and non revenue volumes, by sales year. Natural gas prices are U.S. wellhead price per mcf from EIA.gov. The minimum price of \$1.89/mcf was recorded in April 2012; the maximum price of \$3.62/mcf was recorded in October 2011.

^f Coal prices from EIA.gov: http://www.eia.gov/totalenergy/data/annual/pdf/sec7_21.pdf, updated to 2012-\$ using the CPI-U.

^g The low-end value is the federal grazing fee; the high-end value is the 11 Western state average rental price for private forage.

^h Generation information is not available for these resources.

ⁱ The low-end value is the Mid-Columbia price; the high-end value is the SP 15 price.

^j Source: BLM, PLS, Table 3-12, various years and other BLM data. Does not include volumes and values associated with the BLM's stewardship contracting, as well as modification volume and small sales program volume.

Value Added and Economic Contributions

DOI's FY 2012 value added and economic contribution are estimated to be \$211 billion and \$371 billion, respectively. The value added and economic contributions are estimated to have supported 2.3 million jobs in FY 2012. The value of all commodities and other inputs to production associated with Interior's activities increased by about 7% in nominal terms (5% adjusted for inflation), from \$134 billion in FY 2011 to \$144 billion in FY 2012. The change in value for individual inputs varied significantly across commodities largely due to commodity price changes and changes in the quantity of inputs produced. Detailed estimates of value added, economic contributions, and employment estimates are presented in Table A1-1. Some highlights for value added and economic contributions include the following:

Recreation: An estimated 417 million visits to DOI lands contributed about \$24.7 billion in value added, \$45 billion in output, and supported 372,000 jobs.

Renewable energy: Activities related to geothermal, wind, and solar energy contributed an estimated \$2.3 billion in output, and supported 11,500 jobs. Hydropower contributed about \$1.7 billion in value added, \$2.2 in output, and supported 7,000 jobs.

Energy from Fossil Fuels: Activities related to oil, gas, and coal contributed an estimated \$131 billion in value added, \$230 billion in economic output, and supported 1.2 million jobs.

Non-fuel minerals: Activities related to hardrock minerals contributed an estimated \$13 billion to value added, \$21 billion in output, and supported 111,000 jobs.

Timber: Activities related to timber contributed an estimated \$554 million in value added, \$1.4 billion in output, and supported 7,000 jobs.

Forage: Activities related to forage and grazing on public and Indian land contributed an estimated \$1.6 billion in output, and supported 19,000 jobs.

Concepts: Economic Contributions versus Economic Benefits

The results of an economic contributions analysis should not be equated to an analysis that measures net economic benefits. Net economic benefits are a measure of the extent to which society is better (or worse) off because of a given policy, program or event. Net economic benefits can include measures of market values and non-market values.

Economic contributions analysis estimates the total output, value added, and jobs supported by a flow of expenditures through the economy. Conversely, an analysis of net economic benefits relies on market-based valuation methods as well as non-market valuation methods to derive monetary estimates of benefits and costs to determine the net economic benefits to society. For a further discussion of these issues, see Economic Contributions vs. Economic Benefits on page 125; and Estimating Economic Value on page 130.

Water: Activities associated with irrigation contributed an estimated \$23.1 billion in value added \$43.1 billion in output, and supported 315,000 jobs. Activities associated with municipal and Industrial water contributed about \$3.8 billion in value added, \$4.3 billion in output, and supported 23,000 jobs.

Grants and payments: Activities related to major grants and payments contributed an estimated \$8 billion in value added, \$11 billion in output, and supported 89,000 jobs. BIA grants to tribal governments contributed about \$0.8 billion in value added, \$1.2 billion in output, and supported about 11,000 jobs.

Insular Affairs: Interior's activities related to Insular Affairs contributed about \$1.2 billion in value added (equivalent to a share of GDP ranging from 6% for the Northern Mariana Islands to 62% for the Marshall Islands); and supported about 35,000 jobs.